A STUDY OF IMPAIRED FERTILITY IN FEMALE SWINE

BY

RICHARD FERRIN WILSON

B.S., Iowa State College, 1943
M.S., University of Illinois, 1947

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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A STUDY OF IMPAIRED FERTILITY IN FEMALE SWINE

Sterility and reduced fertility have always been a matter of concern to livestock producers. To date, the causes of these conditions have not been *sufficiently* studied and only few reports are available in the literature. Hammond (1921) reported that about 70 per cent of the ova shed by sows become normal fetuses. A study by Corner (1923) indicated that about 10 per cent of the ova shed failed to segment after ovulation, another 10 per cent degenerated after developing into blastocysts, and 5 to 10 per cent degenerated later in pregnancy with approximately 70 per cent of the ova represented by live pigs at the end of the pregnancy. Warnick, Grummer and Casida (1947) observed structural abnormalities which apparently were the causes of lowered fertility. These included embryonic death, pathology of the oviducts and cystic follicles. Warnick, Grummer and Casida (1948) further reported that, of 63 "repeat-breeder" sows and gilts studied, 39.7 per cent had gross bilateral abnormalities.

This study was made to determine the most common causes of sterility and reduced fertility in female swine, which are due to anatomical and physiological defects. Seventy-nine gilts and sows which had failed to conceive were obtained from Illinois swine producers (group I) and from the University of Illinois herd, other than the Hampshire herd, in the fall and winter of 1947-1948 and 1948-1949. In addition to these females, 20 apparently "sterile" gilts and sows (group II) and 26 normal sows (group III) which had previously farrowed and weaned litters, from the University Hampshire herd were placed on the study during the two years. The females in group I had failed to conceive to an average of 1.6 boars after having been bred in an average of 2.8 heat periods prior to being placed on the experiment. The females in group II had failed to conceive to an average of 1.0 boar after having been bred in an average of 2.1 heat

periods. The females in group I and II were bred in their first heat period on the study. If they did not return in heat they were slaughtered from 28 to 59 days after the beginning of their first or second heat periods. If they returned in heat they were rebred and slaughtered one to two days after the end of that heat period. At the time they were placed on the study the females in group III were divided into two groups, with an equal number of sows in each group. The first group of these females was bred and slaughtered one to two days after the end of their first heat on the study and females of the second group were slaughtered an average of 50 days after the end of their first or second heat periods in which bred on the study, if they were thought to be pregnant. All females were given two or more services in each heat period. At slaughter, observations were made and recorded of all abnormalities of the genital tracts and of all normal observations deemed necessary for the study. The results obtained were:

1. Females in Group I: 53.2 per cent settled on the study. Of these females 9.5 per cent had abnormalities which would be expected to reduce their fertility. The remaining females were apparently normal. Of the 46.8 per cent which did not settle, 10.8 per cent had no apparent abnormalities which could account for their sterility. The abnormalities observed in the remaining females were as follows:

42.4 per cent had abnormalities of the oviducts and fimbriae
12.1 per cent had cystic follicles
9.1 per cent had cystic follicles and abnormalities of the oviducts and fimbriae
9.1 per cent had cystic follicles and ruptured urethral orifices or culs-de-sac
15.2 per cent had blind segments
12.1 per cent had other abnormalities.

2. Females in Group II: 45.0 per cent settled while on the study. Of these females 11.1 per cent had abnormalities which reduced fertility. Of the 55.0 per cent which did not

settle 18.2 per cent had no abnormalities. The remaining females had the following abnormalities:

11.1 per cent had abnormalities of oviducts and fimbriae
55.6 per cent had cystic follicles
11.1 per cent had blind segments
22.2 per cent had other abnormalities.

3. Females in Group III: No gross abnormalities were present in 84.6 per cent of the females. Gross abnormalities were present in 15.4 per cent (3.8 per cent had hydrosalpinx and 11.5 per cent had cystic follicles). The embryonic death from fertilization to 56 days gestation in this group was 30.5 per cent. The over all loss from ovulation to live pigs farrowed was 49.1 per cent.

Tubal abnormalities (hydrosalpinx and pyosalpinx) were found to render a female permanently sterile. This study did not explain the causes of tubal abnormalities since several attempts to produce it experimentally failed. Cystic follicles were present in the ovaries of some of the pregnant and some of the nonpregnant females. They either reduced the reproductive capacity of a female or rendered her temporarily sterile although the duration of the sterile period due to cystic follicles remains problematic. It is possible to diagnose the presence of cystic follicles in living animals with about 41 per cent accuracy. Such females were observed to exhibit a characteristic behavior during the heat period and to have irregular estrus cycles or heat periods. Some females with cystic follicles had enlarged clitoria which were identifiable in the living animal.

Blind uterine horns were generally found to render a female permanently sterile; however, missing segments were found merely to reduce a female's reproductive capacity. Females with infantile reproductive tracts can be identified while alive by the absence of heat periods. Other abnormalities such as ruptured culs-de-sac were also found to reduce the level of fertility in affected females.

Comparison of the results obtained on females from the two sources (Illinois swine producers and the University Hampshire herd) indicate several differences. The most important of these was that the occurrence of tubal abnormalities was much higher in the unselected population than in the University Hampshires. Just the reverse was true in the occurrence of cystic follicles.

Conclusions

Under the conditions of this study the following conclusions seem justified with regard to sterility or impaired fertility:

1. Approximately 50 per cent of the gilts and sows culled as sterile by the Illinois swine producers at the end of the breeding season can be induced to conceive under certain conditions. They must still be regarded as "hard to settle".

2. In about 50 per cent of the females eliminated from herds because they did not settle, abnormalities of the genital tract are rsponsible for reduced fertility and sterility.

3. Tubal abnormalities, particularly hydrosalpinges, are one of the most prevalent causes of permanent sterility in female swine.

4. The presence of cystic follicles may cause temporary sterility in gilts and sows.

5. Blind segments of the reproductive tract will almost always cause complete sterility even though theoretically the females should be able to conceive in the patent horn.

6. Gilts and sows with missing segments of the genital tract will produce smaller litters than normally expected.

7. In the University Hampshire lines which have been maintained as closed lines over a number of years, the incidence of cystic follicles is greater than that observed in the outbred population.

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VITA

Richard Ferrin Wilson was born on a farm near Dundurn, Saskatchewan, Canada, on January 8, 1920. He attended the Dundurn Public School until October, 1937 at which time he moved with his family to a farm near Cherokee, Iowa. There he graduated from the Wilson High School, Cherokee, in May, 1938.

He assisted his father on the farm until entering Iowa State College in September, 1939. He graduated with the degree of Bachelor of Science in Animal Husbandry, March, 1943.

From March, 1943, to June, 1946 he served in the armed forces.

He was married to Miss Helen Ida Neverman, La Moure, North Dakota, on July 10, 1943.

In September, 1946, he enrolled in the Graduate School of the University of Illinois and served as an Assistant in Animal Science. He received the degree of Master of Science in October, 1947, with a major in Animal Science and continued toward a degree of Doctor of Philosophy. His graduate work consists of a major in Animal Science, first minor in Animal Nutrition and a second minor in Physiology.